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**A STUDY OF MORPHOLOGY, PROVENANCE, AND MOVEMENT OF DESERT SAND SEAS IN
AFRICA, ASIA, AND AUSTRALIA**

Edwin D. McKee
U.S. Geological Survey
Denver, Colorado 80225

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Type I Progress Report
ERTS-A

- a. Title: A Study of Morphology, Provenance, and Movement of Desert Sand Seas in Africa, Asia, and Australia

ERTS-A Proposal No.: SR 131

- b. GSFC ID No. of P.I.: IN 402

- c. Problems relating to progress:

With the large number of images and other materials arriving daily for the 16 test sites being studied and compared, a major problem has been the processing of pertinent data. Recent arrangements for the part time assistance of three graduate students in geology from the local university, for the cataloging, plotting, and filing of incoming images, have greatly alleviated this problem.

- d. Discussion and plans:

The first copies of the bulk composite color prints have arrived and have proved valuable. For example, the yellow color of sand bodies in all of the areas for which we now have color coverage makes possible the recognition of recent sands that are not everywhere distinguishable on black-and-white prints. Especially is the color difference useful where dealing with small linear features and also where attempting to distinguish sand bodies from some cloud formations, drifting snow, or salt deposits, all of which appear clearly white.

A problem still confronting the project is determining methods for distinguishing, in ERTS images, between active modern dunes and older stabilized dunes and also between them and erosional patterns in certain sandstones. Some stabilized dune bodies may be recognized by distinctive vegetation, but airplane coverage or ground truth may be required for many areas.

Because an important part of this project is to determine the causes of particular dune-complex patterns and lineation, meteorological data are currently being compiled for the various test sites. Probable relationships of wind direction and wind velocity to dune form and trends will be established, I hope, by comparing maps of dune patterns, as established by ERTS data, with maps of wind directions.

Considerable progress has been made by L. F. Harris in methods of enhancing the ERTS black-and-white positive images that are selected for detailed study and analysis. Enhancement includes rephotographing with different types of negative films, and overdeveloping the films with different developers. A combination of high-contrast copy film and high-energy developer has proved effective in yielding high-contrast photographs. Contrast enhancement by photocopying is found useful in delineating topographic boundaries, which delineation aids in the objective measurement of topographic parameters.

e. Results and application:

With the recognition of principal sand bodies for some of the study areas, attention is now being directed to the recording of sand patterns as a basis for the fundamental classification of these deposits. As the patterns are recorded and plotted, a thematic-type map of the area is being prepared.

At this stage of the investigation attempts are underway to interpret the sand patterns, largely through the use of low altitude air photography. For some sand sites, such as those in parts of Algeria, the dune types responsible for the complexes have been established.

At this time, also, meteorological data covering wind strength and wind direction are being analyzed and recorded for each area and are being plotted on a base map for direct comparison with the thematic dune pattern maps.

f. Reports:

The following two reports were prepared during February and submitted for publication in the formal proceedings of the 1973 Symposium on ERTS-1 Results.

1. McKee, E. D., Breed, C. S., and Harris, L. F., 1973, A study of morphology, provenance, and movement of desert sand seas in Africa, Asia, and Australia.
2. Harris, L. F., 1973, The use of photographic methods in contrast enhancement of ERTS images.

g. Changes in operation:

None

h. Changes in standing order forms:

None

i. ERTS Image Descriptor forms:

Attached

j. Data Request forms:

Attached